

REMARKS

This Amendment is in response to the Office Action mailed on November 13, 2006. Claim 12 is added and is supported, for example, in the specification on page 4, lines 2-6 and page 10, lines 6-8. No new matter is added. Claims 1-4, 6, 11 and 12 remain pending.

§103(a) Rejections:

Claims 1-4, 6 and 11 are rejected under 35 USC 103(a) as being unpatentable over Balasmo (US Patent Publication No. 2003/0031222). Applicants traverse this rejection.

Claim 1 is directed to a semiconductor laser device that requires, among other features, that a ratio between a stripe width at a front end face of a resonator and a stripe width at a rear end face of the resonator satisfies a relationship of $1 < (\text{the stripe width at the front end face}) / (\text{the stripe width at the rear end face}) < 2$. Claim 1 also requires that the stripe width at the rear end face is greater than or equal to $1.4 \mu\text{m}$, but less than $2.0 \mu\text{m}$. Accordingly, the stripe width at the front end face is greater than $1.4 \mu\text{m}$, but less than $4.0 \mu\text{m}$. An advantage of these features is that a kink level during a continuous oscillation operation can be enhanced and stable laser oscillation in the fundamental transverse mode can be realized up to the time of the high optical output operation.

Balasmo does not teach or suggest these features. Moreover, Balasmo teaches away from the features of claim 1. Balasmo is directed to a semiconductor laser element that connects to a single-mode optical fiber without using additional optics (see paragraphs [0001], [0015] and [0067]). As a result, Balasmo requires the width (W3) of the laser (100) to be similar to the mode field diameter (MFD) of the single-mode fiber. The MFD value is preferably between 8 and $8.5 \mu\text{m}$, with the width (W3) chosen in a range defined by $\text{MFD} \pm 40\%$ and preferably $\text{MFD} \pm 15\%$. To facilitate the connection between the laser (100) and the MFD, Balasmo requires the width (W3) to be between $5 \mu\text{m}$ and $20 \mu\text{m}$ and preferably between $7 \mu\text{m}$ and $9 \mu\text{m}$ (see paragraphs [0067]-[0068]). The width (W1) is preferably between $3 \mu\text{m}$ and $5 \mu\text{m}$ (see paragraph [0071]).

With respect to the present invention, the November 13, 2006 Office Action interprets width (W3) to be the stripe width at the front end face of the resonator and

width (W1) to be the stripe width at the rear end face of the resonator. However, claim 1 requires the stripe width at the rear end face to be greater than or equal to 1.4 μm , but less than 2.0 μm . Balasmo teaches away from claim 1 because the width (W1) is preferably between 3 μm and 5 μm while claim 1 requires the stripe width at the rear end face to be greater than or equal to 1.4 μm , but less than 2.0 μm . Furthermore, for Balasmo to teach or suggest the features of claim 1, the width (W1) and the width (W3) must satisfy the relationship of $1 < (\text{the stripe width at the front end face}) / (\text{the stripe width at the rear end face}) < 2$. As Balasmo requires width (W3) to be between 5 μm and 20 μm , width (W1) must be at a minimum 2.5 μm . Thus, modifying Balasmo to meet the requirements of claim 1 is not possible as the width (W1) is too large for the advantages of claim 1 to be achieved. Moreover, if the width (W1) is reduced to meet the requirements of claim 1 the width (W3) will be at best 4 μm which is considerably smaller than MFD, preventing a suitable connection between the semiconductor laser element and the single-mode optical fiber.

Claim 1 further requires the region having the constant stripe width on the front end face side and the region having the constant stripe width on the rear end face both to have a length of one-twentieth or shorter of a length of the resonator. These features allow the present invention to realize stable laser oscillation, as the region not having a constant stripe width, located between the region having the constant stripe width on the front end face side and the region having the constant stripe width on the rear end face side, can have a gentle rate of change in stripe width. Also, the maximum stripe width on either the rear end face or the front end face is 4 μm . This allows laser oscillation with stable optical mode characteristics without requiring a large length of the region having a constant stripe width on the rear end face side.

Balasmo does not teach or suggest these features. In Balasmo, the optical mode characteristics will become unstable if the length (L1) of the region having a constant stripe width on the rear end face is less than .4L (see paragraph [0071]). Since Balasmo also includes a second region (108) and a third region (110) with a large stripe width, the optical mode characteristics will be unstable unless the length (L1) is at least .4L. Nowhere does Balasmo teach or suggest a region having a constant stripe width on a front end face side and a region having a constant stripe width on a rear end face both

have a length of one-twentieth or shorter of a length of the resonator as required by claim 1. For at least these reasons, claim 1 is not unpatentable over Balasmo. Claims 2-4, 6 and 11 depend from claim 1 and should be allowable for at least the same reasons.

Conclusion:

Applicants respectfully assert claims 1-4, 6, 11 and 12 are now in condition for allowance. Claims 7 and 8 should be reinstated for allowance with the remaining claims. If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Douglas P. Mueller (Reg. No. 30,300), at (612) 455-3804.



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